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## Nigerian Transportation Through Mathematics

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## Nigerian Transportation Through Mathematics

Aaron Shields – School not available

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| Grade Level (Req.): 7th-10th grade   | Content Area (Req.): World Geography, English/Reading, Mathematics   | Unit (Opt.):   |
| Connections to Other Disciplines (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>   |  |  |
| Time Frame (Req.): 1 class period  | Goal (Req.): To understand opportunities available in other countries.   |  |
|  | Objective (Req.): Students will compare the percentage of one's income needed to buy a car in Nigeria vs. United States. |  |
| Materials Needed (Req.): <ul style="list-style-type: none"> <li>• GDP per capita figures for Nigeria and the United States</li> <li>• Current exchange rates for the Nigerian Naira</li> <li>• Figures to convert between liters and gallons</li> <li>• Calculators</li> <li>• Chart with car prices, gas prices, and exchange rates for 1984, 1988, 1999</li> <li>• Newspapers with classified ad section</li> <li>•</li> </ul>   |  | New Vocabulary (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul> |
| Anticipatory Set/Introduction [Inquiry Question is required] (Req.): How does the cost of owning a car in Nigeria compare to owning one in the United States?  |  |  |
| Instructional Sequence/Procedure (Req.): <ol style="list-style-type: none"> <li>1. Prior to this exercise, ask the students to find out the following from their parents: What is the current price of gasoline in the area? What is their annual salary? (If you feel that financial issues may be too sensitive, you may use the average Gross Domestic Product (GDP) per capita figure for the United States.)</li> <li>2. Have students look in the classified ads of a local newspaper to find out the price of a car that they would like to buy. Use total cost figures and assume no payment plan is available. Inform the students that in Nigeria one has to pay the total cost for a car up-front because there are no loans or payment plans.</li> <li>3. Find the GDP per capita figures for Nigeria and the United States. These can be obtained from various sources. Here are some websites where you can find this information: CIA World Factbook, United Nations Statistics Division, Infonation.</li> <li>4. Find current exchange rates for the Nigerian Naira. This can be found at the following site: The "Full" Universal Currency Converter (<a href="http://www.xe.com/ucc/full/">http://www.xe.com/ucc/full/</a>).</li> <li>5. Write the necessary conversions between liters and gallons on the board. They are as follows (round as needed): 1 liter = 0.26417204 gallons, 1 gallon = 3.785412 liters</li> <li>6. The prices of cars and gasoline in Nigeria have drastically increased over the years. You could</li> </ol> |  |  |

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| <p>use data from any of the following years depending on whether you want to show just the current prices or whether you want to show how much costs have increased over time. The fractional unit of the Naira is the kobo where 100 k = 1 Naira. (Refer to chart attached below.)</p> <ol style="list-style-type: none"> <li>Using the United States estimates of 10,000 miles driven per year and an average of 25 miles per gallon, have students compute the gasoline costs for a year at current gas prices. (Teacher note: compute this for 400 gallons of gas per year.)</li> <li>Have students combine the gasoline costs with the cost of their dream car.</li> <li>Using the GDP figures for the United States OR the information gathered from parents, have students compute the percentage of an annual income that students would have to spend to acquire and fuel their dream car for a year.</li> <li>Using the cost of gasoline per liter in Nigeria, have students compute the gasoline costs for a year; for simplicity's sake, assume the distances traveled are similar and convert the 400 gallons of gas per year into liters.</li> <li>Have students combine the gasoline costs with the cost of a car in 1999 in Nigeria. You may need to use conversion factors to convert between Naira and US dollars.</li> <li>Using the 1999 figures for car prices and the current GDP per capita for Nigeria, have students compute the percentage of an annual income that a Nigerian would need to spend to acquire and fuel a car for a year.</li> <li>Compare the percentages for the United States with those of Nigeria. Help students to understand the high costs to buy automobiles in developing countries like Nigeria.</li> <li></li> <li></li> <li></li> <li></li> <li></li> <li></li> <li></li> <li></li> </ol> |  |
| Formative Evaluation (Req.): Student worksheet completion.  | Assessment (Req.): Assume your car will break down after 5 years. Ask students whether it would be better for a Nigerian to repair the car they have or whether it would be better to buy another car. Remind them that increased costs during that 5-year period could be dramatic in Nigeria. Have students explain their reasons behind their decision. Help the students to realize that on the limited income a Nigerian has, it would be better to continuously repair cars and keep them running regardless of their outward appearance. Most cars will travel at least 320,000 kilometers (200,000 miles) before their engines die. After that anything that is still good will be salvaged for spare parts to be used in another vehicle. |
| <p>Iowa Core Curriculum Standards Used (Req.):</p> <ul style="list-style-type: none"> <li>Geography, grade 9-12: Understand how physical and human characteristics create and define regions.</li> <li>Geography, grade 9-12: Understand how human factors and the distribution of resources affect the development of society and the movement of populations.</li> <li></li> <li></li> <li></li> <li></li> <li></li> <li></li> </ul>  |  |

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| <ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>   |  |
| Common Core Curriculum Standards Used (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>  |  |
| NGS Standards Used (Req.): <ul style="list-style-type: none"> <li>• How culture and experience influence people’s perceptions of places and regions</li> <li>• The patterns and networks of economic interdependence on Earth’s surface</li> <li>• The changes that occur in the meaning, use, distribution, and importance of resources</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul> |  |
| Five Themes of Geography Used (Req.): <ul style="list-style-type: none"> <li>• Location</li> <li>• Place</li> <li>• Movement</li> <li>•</li> <li>•</li> </ul>  | School District Standards and Benchmarks (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul> |
| 21 <sup>st</sup> Century Universal Constructs (Opt.):  |  |
| Other Disciplinary Standards (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>   |  |
| Other Essential Information (Opt.):  |  |
| Other Resources (Opt.): <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>   |  |

# Student Worksheet

- 1) Current price of gasoline in your area \$ \_\_\_\_\_  
/ gallon
- 2) Annual salary in U.S. \$ \_\_\_\_\_
- 3) Type of car desired:  
Make \_\_\_\_\_  
Model \_\_\_\_\_  
Year \_\_\_\_\_  
Color \_\_\_\_\_
- 4) Cost of car desired \$ \_\_\_\_\_
- 5) GDP per capita in U.S. \$ \_\_\_\_\_
- 6) GDP per capita in Nigeria \$ \_\_\_\_\_
- 7) Nigerian GDP per capita converted to Naira N \_\_\_\_\_
- 8) Gallons of gasoline used per year in U.S. \$ \_\_\_\_\_
- 9) Cost of gasoline for one year in U.S. \$ \_\_\_\_\_
- 10) Cost of car for one year in U.S. \$ \_\_\_\_\_
- 11) Percentage of U.S. annual income to pay for car \_\_\_\_\_%
- 12) Liters of gasoline used per year in Nigeria \_\_\_\_\_
- 13) Cost of gasoline for one year in Nigeria N \_\_\_\_\_
- 14) Cost of car for one year in Nigeria N \_\_\_\_\_
- 15) Percentage of Nigerian annual income to pay for car \_\_\_\_\_%
- 16) Who is paying more of their annual income for a car? \_\_\_\_\_  
[Compare answers 11 & 15 to find out]

|      | <u>Car prices</u> | <u>Gas prices</u> | <u>Exchange rate</u>   |
|------|-------------------|-------------------|------------------------|
| 1984 | 15,000 Naira      | 40 k per liter    | 0.6 Naira =<br>U.S.\$1 |
| 1988 | 250,000 Naira     | 70 k per liter    | 3 Naira = U.S.\$1      |
| 1999 | 2,500,000 Naira   | 20 per liter      | 100 Naira =<br>U.S.\$1 |